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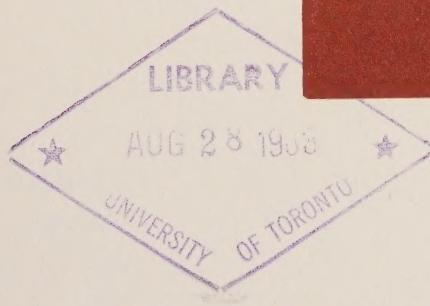
CANADA • Mines, Bureau of Explosives
Division

Annual
report (of the)

(EXPLOSIVES)
(DIVISION)

(calendar year)

1962



(DEPARTMENT OF MINES AND TECHNICAL SURVEYS)



report of the
**EXPLOSIVES
DIVISION**

calendar year 1962

H. P. KIMBELL
Chief Inspector

ROGER DUHAMEL, F.R.S.C.
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THE EXPLOSIVES DIVISION

exists solely in the interests of public safety. Its function is to administer the *Explosives Act* which, by a system of licences and permits supported by inspection, controls the manufacture, authorization, sale, storage and importation of explosives, as well as the transportation of explosives by road.

offices and staff

The technical staff of the Division comprises six inspectors. Four of them—H. P. Kimbell, Chief Inspector; E. J. Fraser, Senior Inspector; and Inspectors R. Hunter and B. P. McHugh—have offices in the Mines Branch Building of the Department of Mines and Technical Surveys, 555 Booth Street, Ottawa 4. Inspector R. P. Quinn works from a branch office at 739 West Hastings Street, Vancouver, B.C., while G. J. Boisjoli has his headquarters in the Bedford Institute of Oceanography Building, Dartmouth, N.S.

Although the clerical establishment is ten, only eight persons were employed during the latter half of the year, in keeping with the Government's economy program announced in June. This reduction has diminished the Division's efficiency in the issue of the various licences and permits.

The physical and chemical testing of explosives required by the Act is performed in the Explosives Laboratory on the River Road near Uplands Airport, Ottawa. The laboratory is administered by the Fuels and Mining Practice Division of the Mines Branch.

manufacture

In commercial blasting explosives the trend of the last few years continued apace. Total production in licensed factories rose to approximately 180 million pounds, but only about half of this was the dynamite type based on nitroglycerin; the other half comprised ammonium nitrate – fuel oil explosives and slurry explosives. Taking into consideration continued field blending under the *Ammonium Nitrate and Fuel Oil Order* the proportion of explosives based on nitroglycerin probably represents little more than 40 per cent of total consumption.

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Conversion to the use of AN/FO explosives in underground mining operations continued at a rapid rate. An excellent summary of this development is given by Arthur E. Dymant of Canadian Industries Limited in a paper published in the August issue of *The Canadian Mining and Metallurgical Bulletin*.

Appendix A is a list of the factories licensed under the Act. There are four more than in 1961 and two of them reflect the new explosives "age" referred to above. Canadian Industries Limited opened a factory for AN/FO explosives near Sudbury, Ontario, serving the mining industry of that area; and Consolidated Mining and Smelting Company of Canada Limited built a factory for AN/FO explosives for use in their mining operations at Kimberley, B.C. The other two new factories are for the manufacture of small-arms ammunition. Winchester-Western (Canada) Limited commenced loading shotgun cartridges at Cobourg, Ontario, and XL Explosives Limited did some partial loading of shotgun cartridges on a temporary basis at Hawkesbury, Ontario. Early in 1963, a licence was also issued to Remington Arms of Canada Limited, Toronto.

The year was marked by resumption of the manufacture of trinitrotoluene at the Beloeil factory of Canadian Industries Limited. Since the fire and explosion at Beloeil, recorded in our 1958 report, trinitrotoluene has been imported from the United States. The new factory is of radically new design for Canada, being the first to use a process of continuous nitration—a process which has considerable safety advantages over the superseded "batch" process.

authorization and testing

Samples examined at the Laboratory totalled 158, as follows:

Blasting Explosives	
(a) for authorization.....	28
(b) run-of-work.....	8
Small-arms Ammunition.....	5
Fireworks.....	97
Blasting Accessories.....	4
For other Government Departments.....	16

Manufacturers are doing a good deal of research toward the improvement of AN/FO explosives and slurry explosives. Most of the samples "for authorization" were modifications of these types.

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The samples "for other Government Departments" denote assistance in assessing the hazards of handling and transporting explosives and other dangerous goods. For example, the Post Office Department requests the Division's assistance in examining samples to ensure that section 59 of the *Post Office Act* will not be violated. Section 59 forbids transmission through the mails of any matter or thing likely to injure any letter or other mailable matter, or the person of any officer or servant of the Post Office.

Twenty-five samples of Chinese firecrackers were sampled and tested by the RCMP at the Port of Vancouver to ensure compliance with the definition: *Chinese firecrackers with gunpowder composition, and not exceeding 2 inches in length and 1/4 inch in diameter, and small Chinese fireworks, are authorized when found to function satisfactorily on examination at port of entry.*

A complete list of explosives authorized for manufacture and importation is given as Appendix D.

licences, permits and certificates

The following were issued during 1962; 1961 figures are in parentheses:

Factory Licences.....	23	(19)
Magazine Licences (storage for sale).....	418	(448)
Temporary Magazine Licences (storage for private use).....	1,081	(990)
Registered Premises Certificates (storage of small quantities for sale).....	97	(100)
Transportation Permits (by road).....	269	(275)
General Importation Permits (one shipment only).....	1,324	(1,372)
Annual Importation Permits.....	60	(45)

imports

Appendix B is a statement, by class and division, of explosives imported during the year under the terms of the importation permits referred to above.

The 7 million pounds "for use in explosives factories" includes smokeless powders not manufactured in Canada, and also considerable quantities of military surplus trinitrotoluene and pentolite for use primarily in the manufacture of slurry explosives such as Hydromex and Tovex.

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The nearly 5 million pounds "for other manufacturing purposes" represents mainly nitrocellulose used in the manufacture of lacquers, coated fabrics and films.

About two thirds of the safety cartridges were .22 caliber and blank rounds.

inspections

All officers, non-commissioned officers and constables of the Royal Canadian Mounted Police are appointed deputy inspectors of explosives by regulation made under the Act. The following statistics include the valuable work done by this force. The figures for 1961 are in parentheses.

Factories.....	60	(47)
Magazines.....	2,212	(1,947)
Registered Premises.....	120	(88)
Transportation.....	107	(80)
Storage in Unlicensed Premises.....	139	(193)

thefts

Seventeen magazines and seven unlicensed premises were broken into and approximately 2,270 pounds of blasting explosives, 5,000 detonators, 2,600 feet of detonating fuse, and small quantities of other explosives were stolen. In eight instances police recovered at least part of the stolen explosives. The culprits were found in seven instances and prosecution followed in four.

A few of the reports showed that security was below the acceptable standard. Inspectors of the Division are constantly urging magazine licensees, and others whose facilities are not required to be licensed, to maintain and improve security by installation of the best locking devices.

Five of the thefts were perpetrated by juveniles bent on adventurous mischief. Three youths stole hand grenades from a railway boxcar in transit between military establishments in Ontario. In Newfoundland, eleven boys used explosives loot to dynamite a disused building in celebration of Guy Fawkes Day. One of them was given a jail sentence, three were fined, and seven were given suspended sentences.

abandoned explosives

There were 37 reports of explosives found abandoned, involving more than 5,000 pounds of blasting explosives and nearly 700 detonators. These explosives were either deliberately abandoned by their owners when they had no further use for them, or had been cached away and forgotten. Each instance represents a menace to public safety and every attempt is made to find those responsible for this inexcusable neglect. In many cases investigation is fruitless but this year there were seven prosecutions under the Act, mining legislation, or the Criminal Code.

Explosives are found in all sorts of places; the year's records show this. They were discovered in a vacant lot, on a beach, in the basement of a house recently purchased, in a tree trunk at a sugar bush, in a roadside ditch, in a clothes closet, in a sawdust pile, in a culvert, in a sack hanging from a tree in the bush, in an old stove, and of course in more likely places such as abandoned mining properties. In one instance a detonator was even discovered between the teeth of a 4-year-old child who had found it in the front yard of his home. Fortunately he was not injured.

destruction of explosives

Dynamite is a perishable commodity and not infrequently it becomes necessary to recommend disposal because deterioration, due to age or poor storage conditions, has made it unfit and unsafe for use. To a lesser extent this applies to detonators too. The 1962 records show destruction of 213,597 pounds of dynamite, 13,816 detonators, and small quantities of other explosives. The following five reports account for 200,000 pounds of the dynamite destroyed:

It was necessary to destroy 1,650 pounds of dynamite that became wet and deteriorated because the magazine, at a mine on the Queen Charlotte Islands, had not been maintained in weatherproof condition.

Two magazines became inundated when the Bear River overflowed its banks near Stewart, British Columbia. It was necessary to destroy 37,150 pounds of blasting explosives, mostly gelatin and semi-gelatin types.

An inspector of mines destroyed 2,650 pounds of dynamite found abandoned in a disused mine tunnel in 1961. Destruction was delayed because of severe winter conditions in the area. The mine owner was prosecuted and fined under the British Columbia *Metalliferous Mines Regulation Act* because he *did unlawfully fail to dispose of explosives stored at a shut-down mine*.

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Contractors constructing runways at Frobisher Airport, Northwest Territories, found themselves with 133,500 pounds of gelatin that was surplus to the work and, after 3 years, had deteriorated. The entire cache was destroyed by a representative of the manufacturer. This meant 10 days work.

When North Rankin Nickel Mines Limited closed its mine in September, all remaining explosives—25,450 pounds of dynamite and an unstated number of detonators—were destroyed.

Mr. A. D. Oliver, Resident Mining Inspector, Whitehorse, rendered valuable assistance in destroying five caches of abandoned explosives in Yukon Territory.

prosecutions

Thirty persons and companies were prosecuted during 1962 and this happens to be the yearly average over the last 5 years.

Twenty-one of the prosecutions followed offences involving improper and insecure storage, but two of these also included charges under Part VI of the Regulations which governs transportation by road. Fines varied from \$10 to \$900. The latter case was one in which an inspector found a road-construction contractor storing surplus explosives in the open under canvas, and also in violation of the regulations which require that trucks moving explosives shall carry a fire extinguisher, shall bear "EXPLOSIVES" warning signs, that the packages of explosives shall be covered with a fire-resistant tarpaulin, that there be no exposed steel in the body, and that stowage shall be such that the explosive is not endangered by any other article or substance carried therewith.

The other nine prosecutions were for offences in road transportation such as inadequate separation between dynamite and detonators, no tailgate on the vehicle, no fire extinguisher, and no "EXPLOSIVES" signs. Fines ranged from \$10 to \$200.

The Division received notification from the Chief Inspector of Mines for British Columbia of three prosecutions under the *Metalliferous Mines Regulation Act* of that province. Two mine owners were each fined \$100 and costs for failing to dispose of explosives when the mine closed down. In the third case a quarry operator paid the same fine for leaving dynamite and detonators lying about at his quarry unprotected and unattended for a period of a week.

Reports were also received of court actions under the Criminal Code for offences involving explosives. A miner in Manitoba was given 2 years suspended sentence when he was found in possession of dynamite and detonators brought up from underground. In another case, referred to in the "Thefts" section of this report, eleven boys were prosecuted following a Guy Fawkes Day escapade. The judge in another case (see Appendix C, Part II, No. 3-9) ruled in favor of the offender following the death of a boy, but there appears no doubt that the security regulations of the *Explosives Act* were not observed.

There were also several prosecutions for violations of municipal bylaws governing safe storage and use of explosives. Fines imposed ranged up to \$300. The cities of Ottawa and Hamilton, Ontario, are notable for their bylaws and they are actively enforced.

accidents

Appendix C, Part I, is a statistical analysis of all explosives accidents which came to notice during 1962, based on the definition that an "accident" is one causing death or injury. The total from all causes was 82, which maintains the improved record of 1961 when the number was 85. The average for the five years 1956 to 1960 was 113.

—in use

(1962) 49 accidents, 11 killed, 50 injured

(1961) 44 accidents, 7 killed, 45 injured

The mining accidents increased to 39, from 29 in 1961, and there were eight fatalities. Three of the fatal accidents merit special attention because they teach an important lesson regarding AN/FO explosives. All three happened underground and are concerned with the method of dealing with misfired charges.

Two of these accidents happened in Ontario mines and in each the miner was killed while reblasting a missed hole which had been loaded with AN/FO and 'bottom primed' with dynamite and capped fuse. In both instances the reblasting resulted in two detonations, with the miner being killed by the second. The method of reblasting was to insert and fire a new primer near the collar. Apparently the AN/FO between the old and

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new primers had failed to detonate with the detonation of the new primer. Instead, it ignited the old fuse which eventually did detonate the first primer.

Following each of these two accidents the verdict of the coroner's jury included reference to evidence indicating an infraction of the regulation that prescribes a specified *waiting period* following a blast. Strict observance of this rule appears to be more than ever necessary when using AN/FO explosives.

Analysis of the third accident resulted in much the same diagnosis of the original cause. A miner in British Columbia was killed when he drilled into a misfired hole. Investigation disclosed that the bootleg hole was probably one which, about 2 weeks previously, had been loaded with AN/FO explosive primed at the bottom with dynamite and capped fuse. It had misfired and had been reblasted by removing just sufficient of the AN/FO to insert a new primer. The following note was appended to the report on this accident issued by the Chief Inspector of Mines: "The Department of Mines and Petroleum Resources issued a circular on March 2, 1962 pointing out that any AN/FO remaining in a hole after a blast is probably insensitive and thus for a reblast the AN/FO should be washed out of the hole and high explosives used. Only in this way can there be some assurance that the original primer will be detonated."

Another accident associated with the development of the underground use of AN/FO explosives is of particular interest because it revealed a property of safety fuse hitherto unsuspected. A detonator crimped to safety fuse exploded when a miner (fortunately he sustained only very slight injury) picked up the fuse to insert it in a drillhole. A discharge of static electricity, generated during pneumatic loading of AN/FO explosives, appeared to be the only possible explanation and a laboratory investigation was undertaken by Canadian Industries Limited. This confirmed that the electrostatic charge, which is known to be easily built up on a man during the operation of pneumatic loading apparatus, is capable, if conditions are right, of exploding a cap through safety fuse crimped thereto—i.e., it is capable of breaking down the insulation of the fuse, passing down the black powder core and discharging by spark through the initiating explosive and metal shell to ground. The hazard of static has been a serious worry since pneumatic loading was introduced, but prior to this accident it was felt that such a hazard was eliminated by specifying use of capped fuse in lieu of electric detonators. Canadian Safety Fuse Co. Ltd. has now developed a static-safe fuse but it is evident that, whatever the means of

initiation, safety demands that pneumatic loading equipment be effectively grounded and that electrically conductive hose be employed under prescribed conditions.

—in manufacture

(1962) 4 accidents, 4 injured

(1961) 4 accidents, 5 injured

Of the four 1962 accidents, three involved ignition of very small quantities of explosives during the manufacture of primers, detonators and fuses, at factories of Canadian Arsenals Limited and Canadian Industries Limited. Only very minor injuries resulted.

The fourth accident happened at the burning-ground of the Ontario factory of Hand Chemical Industries Limited. The injured employee was experienced in burning-ground operations and the accident could be an illustration of how familiarity can breed contempt. His negligence of the rules meant painful facial burns which kept him from work for 12 days. There is a burning-ground at every explosives factory but its isolation too often means infrequent supervision. There can be serious accidents in the destruction of explosives and all factory licensees would do well to bear this in mind.

The explosives manufacturing industry has, in general, a very creditable safety record. For example, there has been only one fatal accident at a dynamite factory in the last 16 years.

—in storage

There were no accidents in this category but report was received of the destruction by fire of a detonator magazine and its entire contents of 7,500 detonators. Although there was some evidence of trespassing, the cause of the fire was never discovered.

—in transportation by road

There were two traffic accidents involving explosives-laden vehicles and, although there was no explosion in either case, the possibilities are alarming enough.

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The first happened near Carp, Ontario, in July. The driver of a truck loaded with 10,000 pounds of a slurry explosive lost control while driving around a curve in the road during heavy rain. The vehicle left the highway, tore off five guard-rail posts, descended a 7-foot embankment, uprooted and severed a 12-inch tree and came to rest on its side. An engine fire was put out with a borrowed fire extinguisher *because the unit on the truck did not function*. The aluminum-covered van was largely demolished and part of its contents, twenty-eight 50-pound packages of explosive, were scattered about near the road. Someone decided that the loose explosive could be burned where it lay, and this was done. Shortly after this accident a circular letter was forwarded to all holders of Transportation Permits reminding them of the specific requirements of the regulations governing procedure for prompt notification of accidents and breakdowns. Certainly no one but an expert should deal with damaged explosives and the manufacturers are always ready and anxious to render assistance in removing hazards resulting therefrom.

The second accident, near Petawawa, Ontario, at the end of October, surely had all the elements of disaster. A truck loaded with 10,000 pounds of dynamite collided with a bus carrying fifty people. In spite of reduced visibility due to falling snow the driver had pulled out to pass a car and attempted to evade the oncoming bus by crossing the highway into the left ditch. The bus struck the right side of the truck behind the cab and the impact tore the side from the truck van, broke the rear-axle housing and spun the vehicle around 180 degrees. There was no fire although the diesel engine of the overturned truck continued to run until stopped by the emergency fuel shut-off valve. Four packages of dynamite were damaged and the contents scattered about. Nineteen of the bus passengers were injured, two seriously.

Human error or driver incompetence appears to be the outstanding feature of these two accidents; indeed in the second incident the driver was convicted and fined under the *Highway Traffic Act*. Provincial authorities were consulted as to whether it may be possible, perhaps by special examination, to ensure competence of those who drive vehicles loaded with explosives and, for that matter, other dangerous articles of commerce. It was significant that the same owner was involved in both of the described incidents and he has been sternly warned that driver standards must be improved.

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During 1962 the Division published a revised brochure entitled "Trucking Explosives in Canada" which gives a summary of the regulations governing road transportation. This is being widely distributed to truckers and magazine licensees.

—in misuse

(1962) 23 accidents, 2 killed, 28 injured

(1961) 34 accidents, 3 killed, 44 injured

A brief description of the circumstances of all misuse accidents, as well as those under the "miscellaneous" heading, is given in Appendix C, Part II.

There were fourteen accidents caused by playing or tampering with detonators and dynamite. A perusal of the details shows once again that most could have been avoided by simple precautions on the part of those who store and use explosives. Most of the victims were juveniles who found explosives that had been mislaid, merely "hidden in a safe place", or carelessly left lying about. Even adults get into trouble on occasion, as was exemplified by the man who attempted to repair his fishing rod with an aluminum tube which turned out, to his cost, to be a detonator.

Again this year all of the reported fireworks accidents were caused by the noise-making firecrackers.

Reports were received of only two accidents in the home-made explosives category. The fatal one happened on the second day of January and was dealt with in our 1961 report but perhaps it is worth while to again quote the verdict of the coroner's inquest:

PAUL DEJOURDAN, age 14 years, came to his death by injuries received in an explosion of a home-made bomb. The explosion was purely accidental and we attach no blame to any person other than the deceased. We recommend that a definite programme of education to inform children and adults of the dangers of mixing certain elements which may produce fatal results be emphasized. The interest in Science to-day being at such a high level, we feel this is paramount, and will help to prevent a recurrence of such accidents.

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It is noteworthy that no reports were received of accidents caused by adventures in amateur rocketry. There was, however, a serious fire in an office building in a congested area of the City of Quebec. In the small hours of the morning a rocket was charged with a propellant composed of zinc dust and sulphur. This is a mixture commonly recommended for amateurs, and the evidence indicates that there was little respect for its potential. No doubt previous experiments had indicated it was not very sensitive but suddenly there was a fire which caused an estimated \$70,000 in damages. Fortunately no one was injured although five adults were present.

There is continuing evidence that boys are greatly intrigued with rocketry as a hobby. Correspondence indicates that some of them are genuinely interested in the science, but there is no doubt that many are merely fascinated by the glamour of firing a missile into the wild blue yonder. The Division has consistently warned that experimentation with rockets is dangerous and illegal, but a recent development does indicate the possibility of some modification in this stand. In the United States an organization known as the "National Association of Rocketry" has attempted to provide an outlet for enthusiasm by the encouragement of what they call "model rocketry" in which only a cartridge propellant, manufactured commercially, may be employed. This eliminates the serious dangers involved in the preparation of home-made propellants, and the Division is exploring the possibility of legalizing safe experimentation on this basis. The Canadian Aeronautics and Space Institute, who have always shown much interest in the problem presented by amateur rocketry, have agreed to submit a recommendation for a safe program involving supervision of the launching operation.

In the continuing campaign against misuse accidents of all kinds the Division has just published a new brochure entitled "Explosives are for Experts" and is asking the co-operation of safety councils and others in its distribution.

conventions

At Percé, Quebec, in June, G. J. Boisjoli delivered an address on the working of the *Explosives Act* to the Annual Convention of the Province of Quebec Police and Fire Chiefs' Association.

In September the Chief Inspector again attended the Annual Conference of Provincial Mines Ministers for collaboration with mining authorities in the expanding use of AN/FO explosives underground.

APPENDICES

EXPLOSIVES DIVISION

appendix A

Factories Licensed to Manufacture Explosives, 1962

Owner	Location of Factory	General Nature of Product
W. F. Bishop & Sons Limited	Unionville, Ont.	Fireworks
Canadian Arsenals Limited	St. Paul l'Ermite, Que.	Military ammunition
Canadian Arsenals Limited	Valcartier, Que.	Military ammunition
Canadian Arsenals Limited	Nitro, Que.	Military explosives
Canadian Industries Limited	Beloeil, Que.	Blasting explosives, fuse powders, nitro-compounds
Canadian Industries Limited	Brainerd, Man.	Blasting explosives
Canadian Industries Limited	Brownsburg, Que.	Ammunition, detonators, blasting accessories, pyrotechnic signals
Canadian Industries Limited	Calgary, Alta.	Blasting explosives
Canadian Industries Limited	James Island, B.C.	Blasting explosives
Canadian Industries Limited	Nobel, Ont.	Blasting explosives
Canadian Industries Limited	Seven Islands, Que.	Blasting explosives
Canadian Industries Limited	Sudbury, Ont.	Blasting explosives
Canadian Safety Fuse Company Limited	Brownsburg, Que.	Safety fuse, detonating fuse, blasting accessories.
Consolidated Mining and Smelting Company of Canada Limited	Kimberley, B.C.	Blasting explosives
Cyanamid of Canada Limited	Niagara Falls, Ont.	Nitroguanidine
Delta Explosives Limited	St. Joseph du Lac, Que.	Blasting explosives
DuPont of Canada Limited	North Bay, Ont.	Blasting explosives
Gevelot of Canada Limited	Saskatoon, Sask.	Ammunition
Hand Chemical Industries Limited	Cooksville, Ont.	Fireworks and military pyrotechnics
Hand Chemical Industries Limited	Papineauville, Que.	Fireworks and military pyrotechnics
Iron Ore Company of Canada	Schefferville, Que.	Blasting explosives
Winchester-Western (Canada) Limited	Cobourg, Ont.	Ammunition
XL Explosives Limited	Hawkesbury, Ont.	Ammunition

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appendix B

Explosives Imported into Canada, 1962

Class	Division	Description	Quantity
I		Gunpowder.....	500 lb.
II		Nitrate mixtures.....	1,035 lb.
III		Nitro-compounds—	
	1 and 2	Blasting explosives.....	134,230 lb.
	2	Propellants.....	63,698 lb.
	2	For use in explosives factories.....	7,001,717 lb.
	2	For other manufacturing purposes.....	4,856,658 lb.
VI	1	Primers.....	1,953,274 units
	1	Safety fuse.....	30,000 feet
	1	Safety cartridges.....	36,180,000 rounds
	2	Detonating fuse.....	372,233 feet
	2	Seismic explosives.....	49,230 lb.
	3	Detonators.....	306,970 units
VII	2	Manufactured fireworks.....	1,208,144 lb.
		Miscellaneous.....	29,553 lb.

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appendix C

Part I—Accidents Involving Explosives, 1962

Circumstances or Cause	Mines and Quarries			Elsewhere			Total		
	Acci-dents	Killed	In-jured	Acci-dents	Killed	In-jured	Acci-dents	Killed	In-jured
In Use									
a Delaying too long in lighting fuse.....	2	.....	2	.....	.....	.....	2	.....	2
b Premature firing of electrical blasts.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
c Not taking proper cover.....	2	.....	2	2	.....	2	4	.....	4
d Projected debris.....	2	.....	2	.....	.....	.....	2	.....	2
e Returning too soon after blasting.....	7	2	6	2	.....	3	9	2	9
j Improper handling of misfires.....	1	.....	1	.....	.....	.....	1	.....	1
g Rough tamping.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
h Ignition of explosives by flames, sparks, etc.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
i Drilling into explosives.....	9	4	10	3	.....	3	12	4	13
j Striking unexploded charge in removing debris.....	3	.....	3	.....	.....	.....	3	.....	3
k Preparing charges.....	4	.....	4	.....	.....	.....	4	.....	4
l Using too short a fuse.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
m Insufficient ventilation after blasting.....	2	.....	4	.....	.....	.....	2	.....	4
n Springing shots.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
o Inadequate guarding.....	1	.....	1	1	1	1	2	1	2
p Various.....	6	2	6	2	2	.....	8	4	6
Total.....	39	8	41	10	3	9	49*	11	50
In Manufacturing.....									
In storage.....	.....	.....	.....	.....	.....	.....	4	.....	4
In Transportation (by road).....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	.....	.....	.....	.....	.....	.....	4	.....	4
In Misuse									
(a) Detonators.....	.....	.....	.....	.....	.....	.....	12	.....	17
(b) Other explosives.....	.....	.....	.....	.....	.....	.....	2	1	2
(c) Fireworks.....	.....	.....	.....	.....	.....	.....	7	.....	7
(d) Home-made explosives.....	.....	.....	.....	.....	.....	.....	2	1	2
Total.....	.....	.....	.....	.....	.....	.....	23†	2	28
Miscellaneous.....	.....	.....	.....	.....	.....	.....	6†	5	7
Total All Circumstances.....	39	8	41	10	3	9	82	18	89

* These accidents occurred in circumstances not directly controlled by the Act.

† Brief descriptions of these accidents are given on the following pages.

appendix C

Part II—Misuse of Explosives

Ref. No.	Cause of Accident	Killed	Injured
(a) Detonators			
1-3	A man lost the thumb and forefinger of his right hand through the explosion of a detonator. He found the detonator in a tool box, did not recognize it as such, and attempted to use it as a sleeve to repair his fishing rod.....		1
2-5	A 13-year-old boy lost the thumb, forefinger and middle finger of his right hand when a detonator he was tampering with exploded. The detonator was one of twenty stolen by a group of teenagers from the cab of a derelict truck on farm property. The owner was subsequently prosecuted for illegal storage.....		1
2-6	A teenage boy lost three fingers and part of his left hand when a detonator he was carrying exploded as he tripped and fell on it. He had found two detonators near his home.....		1
1-7	A 12-year-old boy suffered superficial injuries when a blasting cap he was heating with a match exploded. Detonators had been stolen from a licensed magazine by a group of boys on a picnic. They maintained that the building was not locked.....		1
3-7	A 10-year-old boy suffered lacerations to face and hands when a detonator exploded as he struck it with a brick. His sister had found the detonator in rubble being used as fill.....		1
4-7	A 10-year-old boy suffered superficial injuries when he exploded a detonator by striking it with a rock. The detonator was found on a beach.....		1
1-8	An 11-year-old boy suffered superficial injuries to the face and hands when a detonator he was hitting with a rock exploded. The detonator was obtained from an unlocked receptacle at a construction site.....		1
2-9	An 8-year-old boy suffered injuries to the face and neck when he exploded a detonator by striking it with a rock. The detonator had been found on a construction site after blasting was completed.....		1
1-10	Four juveniles sustained minor injuries when they applied heat to a detonator with a cigarette lighter. The cap had been found on the ground in the vicinity of blasting operations.....		4
2-10	A 13-year-old boy lost the thumb and index finger of his right hand and his 8-year-old sister sustained superficial injuries to both hands when a detonator they were attempting to cut in half exploded. The detonator was part of a cache hidden in a garage by their father and found by the children.....		2

EXPLOSIVES DIVISION

appendix C

Part II—Misuse of Explosives—*continued*

Ref. No.	Cause of Accident	Killed	Injured
(a) Detonators—<i>continued</i>			
5-11	A 12-year-old boy suffered minor injuries when he exploded a detonator. He and a companion had stolen 200 detonators from a receptacle at a construction site. The report indicates that the locking device was affixed by screws only.....		1
(b) Other Explosives			
2-8	An 18-year-old lost his right hand when a primed stick of dynamite blew up in his hand. His 13-year-old companion suffered facial injuries. They had found dynamite, detonators and fuse under an abandoned cabin and were priming each stick, lighting the fuse and throwing these prize fireworks into the river.....		2
3-9	A 16-year-old boy was killed when a bullet from his rifle detonated some dynamite hidden under a wooden platform. The owner of the explosive was charged with negligence under the Criminal Code, but acquitted....	1	
(c) Fireworks			
2-1	A young Indian suffered a badly injured left hand when he struck a large foreign-made firecracker with an axe. Since the firecracker was found on a beach, it may have been thrown from a ship.....		1
1-5	A 9-year-old boy suffered back burns from a firecracker stuffed inside his shirt by a companion.....		1
3-10	An 11-year-old boy lost the forefinger of his right hand and the tips of three other fingers when a firecracker he inserted into an old mortar set off some explosive remaining therein.....		1
4-10	A boy sustained chest and neck burns when he dropped a firecracker into an old car gastank.....		1
1-11	A 9-year-old boy suffered second- and third-degree burns when firecrackers in his coat pocket caught fire.....		1
2-11	An 11-year-old boy suffered third-degree burns when firecrackers in his pocket caught fire.....		1
3-11	A 10-year-old boy suffered second- and third-degree burns when firecrackers in his pocket caught fire.....		1

appendix C

Part II—Misuse of Explosives—concluded

Ref. No.	Cause of Accident	Killed	Injured
(d) Home-made Explosives			
1-1	A 14-year-old boy was killed by the explosion of a home-made bomb. The 3-ounce explosive charge of the bomb, contained in a 1-inch elbow, was no doubt set off by friction during assembly. A local druggist had warned both the boy and his father of the dangers of mixing certain chemicals.....	1	
5-10	Two 14-year-old boys suffered facial cuts from the explosion of a home-made bomb contained in a glass bottle.....		2
Miscellaneous			
1-2	A 35-year-old man was killed by the explosion of a bomb which had been wired to the ignition system of his car.....	1	
2-2	A Sons of Freedom Doukhobor was killed and four companions injured by the premature explosion of a home-made bomb they were carrying in a car.....	1	4
1-6	A man died instantly from injuries apparently self-inflicted by means of explosives.....	1	
2-7	Two men were injured and \$5,000 damage done to a dock by the explosion of three cartons (about 80 lb. gross) of "Seal Salutes"—an underwater firecracker used to scare seals away from the vicinity of fish nets. The salutes were detonated when a lift-truck tipped and fell on them.....		2
1-9	A 34-year-old man was critically injured by the explosion of a home-made bomb set to detonate when he started his car.....		1
4-11	A young miner killed himself and his wife by setting off some dynamite in his car.....	2	

EXPLOSIVES DIVISION

appendix D

Authorized Explosives

Manufactured in Canada

Canadian Industries Limited, Montreal, Que.

Detonators, Electric Detonators and Squibs
Delay Switch
Dextrinated Lead Azide
Heater Cartridge
Highway Flares
Igniter Cord Electric Starter
Lead Salt
Lead Styphnate (Normal)
Marine Flares
MS Detonating Relay
Percussion Caps
Railway Fusees
Railway Track Signals
Safety Cartridges
Styphnic Acid
"Sureshot" and "Seismic Marine" Boosters
Tetrazene

Amex and Amex II

Amite
Ammonia Dynamite—20, 25, 30, 35, 40, 50 and 60 per cent
Ammonia Dynamite, Agricultural—60 per cent (for export only)
Ammonia Dynamite Extra—40, 50, 60 and 70 per cent (for export only)
Ammonia Dynamite, Free Running—40 and 65 per cent
Ammonia Dynamite, High Density—20, 25, 30, 35, 40, 50 and 60 per cent (for export only)
Ammonia Dynamite, Low Density—20, 25, 30, 35, 40, 50, 55 and 60 per cent (for export only)
Ammonia Dynamite, Quarrying—60 per cent
Ammonia Dynamite, Seismograph—60 per cent (for export only)
Ammonia Dynamite, Stumping—20 per cent (for export only)
Ammonia Gelatin—30, 35, 40, 50, 60, 75, 80 and 90 per cent (for export only)
Belite A and B—60 per cent
Black Blasting Powder
Blastol—60 per cent
BRX-7—75 per cent
Cilgel-B and Cilgel-C—70 per cent
C.I.L. Dynamite—Nos. 3 and 5
C-X-L Gelatin—Nos. 1 and 2
C-X-L-ite
Detonating Fuse Primer
Ditching Dynamite—50 per cent
Dygel—75 per cent
Dynamex—40, 50, 60 and 70 per cent
Exel-G, Exel-S and Exel GW—75 per cent
Explosives BL-100, BL-112, BL-114, BL-115, BL-116, BL-125, BL-130, BL-132, BL-134, BL-135, BL-136, BL-144, BL-145, BL-147, BL-148, BL-149, BL-150, BL-151, BL-152, BL-153, BL-156, BL-158, BL-160, BL-161, BL-162, BL-163, BL-164, BL-166, BL-167, and BL-168

Authorized Explosives—continued

Manufactured in Canada—continued

Canadian Industries Limited—concluded

Forcite—30, 35, 40, 50, 60, 75, 80 and 90 per cent
Fuse Powders—35, 40, 44, 53 and 65 seconds
Gelatin Dough—90 per cent
Geogel—60 per cent
Giant Gelatin—30, 35, 40, 50, 60, 75, 80 and 90 per cent
Guhr Dynamite
Guncotton
Gunpowder
Hi-Velocity Gelatin—40, 60, 75 and 80 per cent
Hydromex and Hydromex M-2
Liquid Nitroglycerin
Loshok—20 per cent
Monobel—Nos. 4, 6, 7, 10, 11, 14 and X(EQ.S.)
Nitrocotton
Nitrone—S-1, T-1, T-3, T-4 and S-M
Nitrone Primer and Nitrone S-1 Primer
Nitropel
Nitrox
Pentaerythritol Tetranitrate
Polar Stumping Powder—20 per cent
Primers—Pentolite, Pento-Mex I, II and III, and Pento-Mite A, B and C
Primite—70 per cent
Pyromex—70 per cent
Seismic Gelatin—60 per cent (for export only)
Semi-Gelatin Nos. 1, 2, 3, 4, and 5 (for export only)
S.N.G.
Stopeite—25, 30, 35, 40, 45, 55, 65 and 70 per cent
Straight Gelatin—25, 30, 35, 40, 50, 60, 75, 80 and 90 per cent (for export only)
Submagel—40, 50, 60, 75, 80 and 95 per cent
Trinitrotoluene
Vibrex—60 per cent
Xactex—75 per cent

Canadian Safety Fuse Company Limited, Brownsburg, Que.

Detonating Fuse
Hot Wire Fuse Lighters
Igniter Cord—“Thermalite” Brand
Igniter Cord Connectors—“Thermalite” Brand
Safety Fuse

Cyanamid of Canada Limited, Niagara Falls, Ont.

Nitroguanidine

Delta Explosives Limited, St. Joseph du Lac, Que.

Deltite
Deltex

DuPont of Canada Limited, Montreal, Que.

DuPont Ditching Dynamite
DuPont Extra Nos. 1, 2, 3, 4 and 5
DuPont Gelatin—25, 40, 50, 60 and 75 per cent

EXPLOSIVES DIVISION

Authorized Explosives—*continued*

Manufactured in Canada—*concluded*

DuPont of Canada Limited—concluded

DuPont Stumping Dynamite

Energex—40, 50 and 60 per cent

Energex FR—25, 40 and 65 per cent

Gelex-A—1, 2, 3, 4 and 5

Gyspal Nos. 1 and 2

Hi-Cap, 1, 2 and 3

Hi-Velocity Gelatin—40, 60 and 75 per cent

NBL-101, NBL-102, NBL-103, NBL-104, NBL-201, NBL-301, NBL-302, NBL-304, NBL-307, NBL-309, NBL-402 and NBL-403

Nilite FR and 310

Nitramite FR and 306

Nitramon Primers

Pelletol Nos. 1 and 2

Pentolite Primer

Seismex—40 per cent

Seismogel—60 per cent

Seismograph "Hi-Velocity"—60 per cent

Semi-Gelatin No. 1

Special Gelatin—30, 35, 40, 50, 60, 75, 80 and 90 per cent

Submarine Hi-Velocity Gelatin—60 and 80 per cent

Super "Tovex" Gel

Tovex and Tovex "G"

"Trimtex" 208

Gevelot of Canada Limited, Saskatoon, Sask.

Safety Cartridges

Remington Arms of Canada Limited, Toronto, Ont.

Safety Cartridges

Winchester Western (Canada) Limited, Cobourg, Ont.

Safety Cartridges

Pursuant to Section 8 of the Act, ammonium nitrate blended with fuel oil is an authorized explosive.

Manufactured by Foreign Firms

Aktiebolaget Bofors, Nobelkrut, Bofors, Sweden

Smokeless Sporting Powder

Detonating Fuse (Bofors Type)

American Cyanamid Co., Latrobe, Pa.

Fulminate of Mercury

Detonators

Atlas Diesel Co., Stockholm, Sweden

Engine Starting Cartridges

Authorized Explosives—continued

Manufactured by Foreign Firms—continued

Atlas Chemical Industries Inc., Wilmington, Del.

Atlas Gelatin—60 and 75 per cent

Atlas RXL—185 and 198

Detonators

Giant Gelatin—40, 60 and 75 per cent

Giant Gelatin, Hi-Velocity—60 per cent

Shaped Charges

Subgel A

Austin Powder Co., Cleveland, Ohio

Ammonia Dynamite—AL-4 and 60 per cent

Apcomite 20-A

Austinite Nos. 15, 20 and 21

Black Pellet Powder

Detonating Fuse

Primers—Pentolite, ANP-16 Amatol and ANP-16 Sodium Amatol

Leon Beaux & Co., Societa Italiana Munizioni, Milan, Italy

Safety Cartridges

Baschieri and Pellarri, Bologna, Italy

Smokeless Powder

Messrs. Germano Benzomi, Bergamo, Italy

Safety Cartridges

Bermite Powder Co., Saugus, Calif.

Baker Power Charge

Firing Head Igniter

Bombrini Parodi-Delfino, Rome, Italy

Safety Cartridges

Cardox Corporation, Chicago, Ill.

Cardox

Cardox Heaters

Cartoucherie Française, Paris, France

Primers and Primed Cases

Safety Cartridges

Smokeless Powder

Cascade Cartridge Co., Lewiston, Idaho

Primers

E. I. DuPont de Nemours & Company, Inc., Wilmington, Del.

Auxiliary Charges C. 63

Black Fuse Powder

Delay Assembly "Ledcore"

EXPLOSIVES DIVISION

Authorized Explosives—continued

Manufactured by Foreign Firms—continued

E. I. DuPont de Nemours & Company, Inc.—Concluded

Detonators and Electric Detonators
DuPont Bulk Powder
DuPont Ditching—50 per cent
DuPont Extra—A, C, E, F and G
DuPont Gelatin—25, 40, 50, 60 and 75 per cent
Ecord Delay Unit
Explosive Rivets
Fulminate of Mercury
Gelex—Nos. 1, 2 and 3
Hi-Velocity Gelatin—40, 60 and 75 per cent
Jet Tappers
NBL-308
Nelite 101 and 202
Nitramon—A, 2 and S
Nitramon Primer and Nitramon S Primer
Nitramex—2 and 2H
Nitramite
Nitramite Primer
Nitrocellulose
Nitrostarch
Oil Well Explosives S.O.W.E. No. 1 and EL-431-A
P.6 Seismograph Booster
Pelletol Nos. 1 and 2
Pentaerythritol Tetranitrate
Plastic Primer
“Primacord” Booster
“Primacord” MS Connector
Primer HDP-1, HDP-2 and HDP-3
Red Cross Extra—40, 50 and 60 per cent
Red Cross Extra (H.W.R.)—40, 50 and 60 per cent
“Rock Breaker” Pellets
Shaped Charges
Sheet Explosive EL-506A
Smokeless Powders
Special Gelatin—30, 40, 50, 60, 75, 80 and 90 per cent
Special Primer with Booster (4 \times 7.5 lb.)
Submarine Hi-Velocity Gelatin—60 and 80 per cent
Tetryl
Waterproof Booster C.66

Dynamit Nobel AG, Troisdorf, Germany

Delay Connector
Detonators and Electric Detonators
Detonating Fuse “Nobel Cord”
Safety Cartridges
Smokeless Powder

Ellefsens Tendskruefabrikk, Stokke, Norway

Time Fuses and Detonators for Whaling Guns

CALENDAR YEAR 1962

Authorized Explosives—continued

Manufactured by Foreign Firms—continued

EM-GE Sportgerate K-G Gerstenberger & Co., Wurttemberg, Germany
Blank Cartridges

Ensign Bickford Company, Simsbury, Conn.

Detonating Fuse
Ignitacord
Igniter Cup
Lead Spitter
Low Energy Detonating Cord
Pull-Wire Safety Fuse Lighter

Farbenfabriken Bayer A. G., Leverkusen, West Germany
Dinitrotoluene

Federal Cartridge Corporation, Minneapolis, Minn.
Safety Cartridges

Federal Laboratories, Pittsburgh, Pa.
Lachrymatory Cartridges
Powder Loads

Gevelot, S. A., 50 Rue Ampere, Paris, France
Safety Cartridges

Giullio Fiocchi, Lecco, Italy
Power Tool Cartridges, Q 4.
Primers and Percussion Caps
Safety Cartridges

Go Oil Well Services Inc., Fort Worth, Texas
Jet Perforators

Greenwood & Batley Ltd., Leeds, England
Safety Cartridges

Gustav Genschow & Co., A.G., Hamburg, Germany
Safety Cartridges

Haerens Ammunition Arsenals, Denmark
Safety Cartridges

Haerens Krudtvaerk Frederikavaerk, Denmark
Safety Cartridges

Harvell-Kilgore Corporation, Bolivar, Tenn.
Flashlight Cartridges
Powder Loads

EXPLOSIVES DIVISION

Authorized Explosives—continued

Manufactured by Foreign Firms—continued

Hercules Powder Company, Wilmington, Del.

Detonators and Electric Detonators
Gelatin Oil Well Explosive
Explosive E.P. 172-1 and 2
Gelamite D
Gelatin Extra—40 and 60 per cent
High Pressure Gelatin—60 per cent
Nitrocellulose
Smokeless Powder
Titan Booster 20
Vibro Caps
Vibrogel B and 3
Vibronite B

Hirtenberger Patronen, A.G., Hirtenberg, Austria

Primers and Primed Cases
Safety Cartridges

Hull Cartridge Co., Hull, Yorkshire, England

Safety Cartridges

Imperial Chemical Industries Limited, England

Black Sporting Powder—FG, FFG, FFFG, and NFFFG
Black Whaling Powder
Cerium Low Tension Fusehead
Detonating Relay
Detonators and Electric Detonators
Gunpowder—G-7, G-12, G-20, SFG-12 and SFG-20
Pentaerythritol Tetranitrate
Percussion Caps
Safety Cartridges
Saluting Powder
Smokeless Powders
Smokeless Whaling Charges
Tetryl

Intermountain Research & Engineering Co. Inc., Salt Lake City, Utah

Procore 3C Booster

Jet Guns Company, Fort Worth, Texas

Shaped Charges
Glass Gun Perforating Charges—G.G. 2, G.G. 4 and G.G. 7

K. & G. Oil Tool & Service Co. Inc., Houston, Texas

Junk Shot

King Powder Co., Cincinnati, Ohio

Black Pellet Powder

CALENDAR YEAR 1962

Authorized Explosives—continued

Manufactured by Foreign Firms—continued

J. C. Kinley Co., Houston, Texas

Shells—P #51, P #70 and P #100

Kinley Sand Line Cutter

Lake Erie Chemical Co., Cleveland, Ohio

Lachrymatory Cartridges

Lane-Wells Co., Houston, Texas

Gun Perforator Cartridges

Lapua Cartridge Factory, Lapua, Finland

Safety Cartridges

Mecca Cable and Service Inc., Houston, Texas

Magniset Cartridges

Mid Continent Torpedo Co. Ltd., Tulsa, Okla.

Red Head Firing Heads

Nitroglycerin Aktiebolaget, Gyttorp, Sweden

Shotgun Tracer Cartridges

Omnipol Ltd., Prague, Czechoslovakia

Safety Cartridges

A. B. Norma Projektilfabrik, Amotfors, Sweden

Safety Cartridges

Olin Mathieson Chemical Corp., East Alton, Ill.

Cyclonite

Detonators and Electric Detonators

Kiln Gun Shells

Linemen's Flare Lights

Normal Lead Styphnate

Railway Fusees

Railway Torpedoes

Safety Cartridges, Western and Winchester

Smokeless Powder

"Tempotool" Cartridges

Osterreichische Jagdpatronenfabrik, Vienna, Austria

Safety Cartridges

Oy Sako, AB, Finland

Safety Cartridges

T. Page-Wood Limited, Bristol, England

Safety Cartridges

EXPLOSIVES DIVISION

Authorized Explosives—*continued*

Manufactured by Foreign Firms—*continued*

Patronenfabrik, A.G., Solothurn, Switzerland

Safety Cartridges

Perforating Gun Atlas Corporation, Houston, Texas

Jet Perforating Charges

Petroleum Tool Research Inc., Fort Worth, Texas

Detonator Assembly

Vibro-Shot Charge Assembly

Pawam-Pionki, Warsaw, Poland

Safety Cartridges

Poudreries Nationales, France

D-2 Propellant Powder

Poudreries Royale De Wetteren "Cooppal & Cie, S.A.", Brussels, Belgium

Nitrocellulose

Safety Cartridges

Povazska Strojarne (Kovo Ltd.) Bystrica, Czechoslovakia

Safety Cartridges

Pringle Powder Company, Bradford, Pa.

Liquid Nitroglycerin

Remington Arms Co. Inc., Bridgeport, Conn.

Safety Cartridges—Remington, Peters and Springfield

Stud Driver Cartridges

Rey Freres, Paris, France

Detonators and Electric Detonators

Detonating Fuse—Plastex and Duplex

Safety Cartridges

Safety Fuse TT, TR

F. J. Roberts Squib Company, Punxsutawney, Pa.

Miner's Safety Squibs

Rohm-Gesellschaft, Sontheim/Brenz, Kreis Heidenheim, Germany

Blank Cartridges

Signal Cartridges

Schaffler & Co., Vienna, Austria

Electric Detonators

Karl Schermer and Co., Karlsruhe, West Germany

Animal Stunner Cartridges

CALENDAR YEAR 1962

Authorized Explosives—concluded

Manufactured by Foreign Firms—concluded

Standard Railway Fusee Corporation, Boonton, N.J.

Railway Torpedoes

AB Svenska Metallverken, Vasteras, Sweden

Safety Cartridges

Temple Cox Development Co. Ltd., Bromley, Kent, England

Animal Stunner Cartridges

Trojan Powder Company, Allentown, Pa.

Nitrostarch

Trojan 40 per cent S, 50 per cent S, ESX, ESX-LD, PT-3X and TL-501-B

Weatherby's Sporting Goods Co., South Gate, Calif.

Safety Cartridges

Authorized Fireworks

Canadian Manufacturers

W. F. Bishop & Son Limited, Toronto, Ont.

Canadian Industries Limited, Montreal, Que.

Canadian Safety Fuse Company Limited, Brownsburg, Que.

Dominion Fireworks Co. Ltd., Dixie, Ont.

Hand Chemical Industries, Cooksville, Ont., and Papineauville, Que.

Foreign Manufacturers (Certain Fireworks Authorized*)

Acme Sparkler and Specialty, River Grove, Ill.

American Railway Signal Company, Fostoria, Ohio

Anthes Division Gleason Corp., Fort Madison, Ohio.

Astra Fireworks Ltd., London, England

M. Backes' Sons Inc., Wallingford, Conn.

E. Benjaminsohn, Falu Pyrotekniska, Industri, Falun, Sweden

J. G. W. Berckholtz, Hamburg-Bahrenfeld, Germany

Hermann Bischoff, Bremen, Germany

Brock's "Crystal Palace" Fireworks Ltd., Hemel Hempstead, Herts., England

Oswald Bradley Ltd., Southport, Lancs., England

Brookside Pyrotechnic & Chemical Co., Elkton, Md.

Bryant & May Ltd., London, England

Contimetal Industry (Hemel Hempstead) Ltd., Hemel Hempstead, Herts., England

EM-GE Sportgerate K-G Gerstenberger Co., Wurttemberg, Germany

Erme-Werke, GMBH, Dachau-Munchen, Germany

Exportvertrieb Pyrotechnik, Hamburg, Germany

Thos. Hammond & Company, Craigmillar, Edinburgh, Scotland

Haley & Weller Ltd., London, England

Harvell-Kilgore Corporation, Bolivar, Tenn.

* A list of authorized fireworks is on file in the office of the Explosives Division. Information may be obtained on request.

EXPLOSIVES DIVISION

Authorized Fireworks—concluded

Foreign Manufacturers (Certain Fireworks Authorized*)—concluded

Hitt Fireworks Company Limited, Seattle, Wash.
Hudson Fireworks Display Company, Hudson, Ohio
Illinois Fireworks Co., Danville, Ill.
Interstate Fireworks Manufacturing and Display Co., Bridgewater, Mass.
James Pain & Sons Ltd., Eastfield, Mitcham, Surrey, England
Japan Fireworks Trading Company Ltd., Tokyo, Japan
Jatina Manufacturing Co. Inc., Mount Vernon, N.Y.
Keystone Fireworks Manufacturing Co. Inc., Dunbar, Pa.
Lakeside Railway Fusee Company, South Beloit, Ill.
Lenover Corporation, Chester, Pa., and Lenover, Pa., (J. Halpern, Pittsburg, Pa.,
Distributors)
Marutamaya Ogatsu Fireworks Co., Tokyo, Japan
National Fireworks Incorporated, West Hanover, Mass.
New Jersey Fireworks Mfg. Co. Inc., Elkton, Md.
S. V. Olsen, Valby Tingsted, 10 Kobenhavn VBY, Denmark
Olin Mathieson Chemical Corporation, New Haven, Conn.
N. V. Pyro, Klazienaveen, Holland
Penguin Associates Inc., Devon, Pa.
Pyro-Chemie, (Hermann Weber & Co.) Eitorf/Sieg, West Germany
Pyrotechnischen Fabriken, Wuppertal-Ronsdorf, Germany
Pyrowerk, Hamburg-Neugraben, Germany
Reliance Snap Company, Bishop's Stortford, Herts., England
Richard Appel's Jo King, New York, N.Y.
Schermuly Pistol Rocket Apparatus Ltd., Newdigate, Surrey, England
Schiebeler & Co., Hamburg, Germany
Shioji and Co. Ltd., Osaka, Japan
Societe Pyragric, Rillieux (Ain) Banlieue de Lyon, France
Standard Fireworks Limited, Huddersfield, England
Standard Railway Fusee Corporation, Boonton, N.J.
Stehling and Co., Hamburg, Germany
The J. & E. Stevens Sales Co., New York, N.Y.
Superior Signal Co. Incorporated, South River, N.J.
United Fireworks Manufacturing Company, Dayton, Ohio
U.S. Fish and Wildlife Service, Pocatello, Idaho
Van Karner Chemical Arms Corporation, New York, N.Y.
Messrs. Waeco Ltd., High Post, Salisbury, England
Joseph Wells & Sons Limited, Dartford, Kent, England
Joh. Chr. Wendt, Hamburg, Gr. Borstal, Germany
Wischo-K. G. Wilsker Co., Erlangen, West Germany
Wunderkerzen-Werk Carl Flemming, Hamburg-Neugraben, Germany

Chinese Firecrackers with gunpowder composition, not exceeding 2 inches in length and $\frac{1}{4}$ inch in diameter, and small Chinese Fireworks, are authorized when found to function satisfactorily on examination at port of entry.

